

REMARKS

Upon entry of the present amendment, Claims 1-13 are pending in this application. The present amendment does not introduce new matter.

Claims 1-13 have been rejected.

Claims 1 and 11 have been amended. Support for the amendments in claims 1 and 11 can be found in the specification on page 11, lines 3-15.

Attached hereto is a marked-up version of the changes made to the claims by the current amendment. The attached page is captioned "**VERSION WITH MARKINGS TO SHOW CHANGES MADE**".

The Examiner's rejections and objections will be addressed in turn as set forth in the Office Action.

I. DRAWINGS

The drawings have been objected to because Figure 1 is prior art and is not labeled as such. A corrected formal drawing is submitted herewith. The objection to the drawing is now moot and should be withdrawn.

II. CLAIM OBJECTIONS

Claims 1 and 11 are objected to because the phrase "is in" line 7 of claim 1 and claim 11 should be --will--. Claims 1 and 11 have been amended in response to the rejection under 35 USC §103 and this objection is now moot and should be withdrawn.

III. REJECTION UNDER 35 U.S.C §103

Claims 1-13 stand rejected under 35 U.S.C §103(a) as being unpatentable over U.S. Pat. No. 5,538,230 to Sibley (hereafter referred to as "Sibley").

Obviousness requires that there be some motivation, suggestion, or teaching of the desirability of making the specific combination that was made by the applicant. (In re Kotzab, 55 USPQ2d 1313, 1317 (Fed. Cir. 2000)).

As recited in Applicant's previous response dated June 4, 2001 (and resubmitted on September 4, 2001), Sibley is directed to a wafer carrier comprised of a single piece of silicon carbide configured as a cylindrical shell section (22) and which has an outer convex surface (23) and an inner concave surface (24). The cylindrical shell (22) lies outside the radius of inner concave surface (24). The boat (20) disclosed in Sibley has four slot-containing inwardly convex surfaces (34) which extend toward the wafer center to a distance r_3 . Surfaces (34) are provided with a plurality of grooves or slots (35) into which the wafers are placed. This embodiment is illustrated in Fig. 1 of Sibley. In an alternative embodiment disclosed in Sibley, and illustrated in Fig. 3, the boat is provided with only two inwardly extending surfaces (34), each of which has a row of slots (35) equally spaced along the longitudinal axis of the cylindrical shell.

The present Office Action recites on Page 3 that the slots in Sibley comprise the first (left side) and second (right side) upper supporting guides (slots 35) and the lower groove portions (not numbered, defined by an inwardly bend in groove 34, see Figure 1, 3 and 4, or lower groove portion 74 in Figure 5) of which the wafer is in contact and supported by the slots thereon the inwardly bended groove surfaces that are positioned between the bottom supporting groove (30, see Figures 1, 3 and 4, and two grooves defined by projections to form supporting legs, not numbered, see

Figure 5) and the at least one window (32) positions substantially in a small distance from the end of the boat.

The Examiner noted in the present Office Action that Applicant's arguments filed September 4, 2001 have been considered but that they are not persuasive. That Examiner recited that he disagrees with applicant's remarks on page 13, lines 2-4, that Sibley does not disclose a lower arcuate groove portion of which the wafer is being supported and positioned in the slots. The Examiner notes that Figures 1, 3 and 4 of Sibley clearly shows that a lower bend in arcuate groove (34) has a plurality of slots thereon to support the weight of a wafer in each individual slot, or an inwardly bend arcuate lower groove (74) shown in Figure 5. The Examiner states that "it appears that applicant has failed to define the arcuate groove of the invention, instead, relying on the specification to impart the claims limitations not otherwise recited therein. This reliance is ineffective."

Applicant has amended independent claims 1 and 11 to further define the **arcuate lower grooved portion** of the claim. Sub-part c) of claim 1 and claim 11 have been amended to recite:

- c) an arcuate lower grooved portion for receiving the lower area of the semiconductor wafers, wherein at least a part of the lower area of each of the semiconductor wafers in said plurality of slots contacts the lower arcuate grooved portion such that the lower arcuate grooved portion substantially conforms to the at least a part of the lower area of the semiconductor wafers that contact the arcuate lower grooved portion and which supports the weight of the semiconductor wafer positioned thereon.

As amended, sub-part c) of claims 1 and 11 recite that the arcuate lower grooved portion receives and supports the lower area of semiconductor wafers wherein the lower area of the

semiconductor wafer contacts at least a part of the lower arcuate grooved portion such that the lower arcuate grooved portion substantially conforms to the at least a part of the lower area of the semiconductor wafers that contact the arcuate lower grooved portion. This is aspect of the wafer boat substantially different from the wafer boat described in Sibley. These amendments are supported in the specification on page 11, lines 3-15.

The boat (20) disclosed in Sibley has four slot-containing **inwardly convex surfaces** (34) which extend toward the wafer center to a distance r3. Surfaces (34) are provided with a plurality of grooves or slots (35) into which the wafers are placed. This embodiment is illustrated in Fig. 1 of Sibley. In an alternative embodiment disclosed in Sibley, and illustrated in Fig. 3, the boat is provided with only two inwardly extending surfaces (34), each of which has a row of slots (35) equally spaced along the longitudinal axis of the cylindrical shell.

Sibley does not teach or suggest arcuate lower grooved portion receives and supports at least a part of the lower area of semiconductor wafers wherein the lower area of the semiconductor wafer contacts the lower arcuate grooved portion such that the lower arcuate grooved portion substantially conforms to the at least a part of the lower area of the semiconductor wafers. As illustrated in Figs. 2, 3 and 4 of the present application, arcuate lower groove 20 which receives and supports at least a part of the lower area of a semiconductor wafer wherein the wafer contacts the lower arcuate grooved portion and substantially conforms to the lower area of the semiconductor wafer is not an "inwardly convex surfaces" as recited in Sibley, but rather is an **outwardly concave-like** grooved portion as illustrated in Figs. 2, 3 and 4 of the present application. The arcuate outwardly concave-like lower grooved portion 20 as illustrated in Fig. 2, 3 and 4 of the present application receives and supports at least a part of the lower area of a semiconductor wafer wherein **at least a part of the lower area of each of the semiconductor wafers in said plurality of slots contacts the lower**

arcuate grooved portion such that the arcuate lower grooved portion substantially conforms to the at least a part of the lower area of the semiconductor wafers that contacts the arcuate lower grooved portion.

As described in the specification of the present application on page 10 (last paragraph) to page 11, the wafer boats described in Sibley and illustrated in the figures therein, support each wafer at four points (two lower points and two upper points), the wafer boat of the present invention is provided with two upper support guides 18a and 18b and a single lower supporting arcuate grooved portion 20 to support the weight of the wafer. The four inwardly convex surfaces 34 as taught by Sibley with regard to Fig. 1, the two inwardly convex surfaces taught by Sibley with regard to Fig. 3 and the three inwardly extending surfaces taught by Sibley with regard to Fig. 5 all teach away from the lower arcuate grooved portion 20 of the wafer boat of the present since the inwardly convex surfaces of Sibley do not substantially conform to at least a part of the lower area of a semiconductor wafer. Unlike Figs. 2, 3 and 4 of the present application which illustrate an arcuate outwardly concave-like lower grooved portion 20 to receive at least a part of the lower area of a semiconductor wafer wherein **at least a part of the lower area of each of the semiconductor wafers in said plurality of slots contacts the lower arcuate grooved portion such that the arcuate lower grooved portion substantially conforms to the at least a part of the lower area of the semiconductor wafers that contacts the arcuate lower grooved portion** so as to support the lower portion of the semiconductor wafer thereon, Figs. 3, 4 and 5 of Sibley do not illustrate an arcuate outwardly concave-like grooved portion wherein **at least a part of the lower area of each of the semiconductor wafers in said slots contacts the lower arcuate grooved portion such that the arcuate lower grooved portion substantially conforms to the at least a part of the lower area of the semiconductor wafers that contacts the arcuate lower grooved portion**. In fact, in Fig. 3 and

4 of Sibley, the lower area of wafer 27 does not even contact a lower grooved portion, nor substantially conform thereto. In Fig. 3, the wafer appears to be retained by slots 35 and the wafer does not contact any lower grooved portion. Likewise, in Fig. 4, wafer 27 appears to be retained by slots 34 and 35. Furthermore, element 33 in Fig. 4 is described in the specification (Col. 5, line 10) as a flat base as opposed to an arcuate grooved portion taught by the present invention that conforms to the lower area of a wafer. Fig. 5 of Sibley illustrates inwardly extending surfaces 74. None of the inwardly extending surfaces 74 in Fig. 5 of Sibley, particularly the lower inwardly extending surface 74, substantially conforms to at least a part of the lower area of the semiconductor wafer that contacts the arcuate lower grooved portion as described in the present application. As recited in the specification of the present application on page 11, the wafer boat having an arcuate lower grooved portion as described and shown in the figures supports the wafer across the entire arcuate portion of the circular wafer's periphery which is in contact with the arcuate lower grooved portion. The wafer boat having this configuration provides exceptional support for and stabilization of the wafers positioned in the slots of the wafer boat.

By the amendments made to claims 1 and 11, applicant believes that the claims now clearly define the lower arcuate grooved portion and is not obvious in view Sibley. Since Sibley does not teach or suggest the unique configuration of the lower grooved portion of the wafer boat as recited in amended claims 1 and 11 and as discussed above, amended independent claims 1 and 11 are not unpatentable under 35 U.S.C. §103(a) over Sibley. Claims 2-10 depend directly or indirectly from amended claim 1 and claims 12 and 13 depend directly or indirectly from amended claim 11 and thus incorporate all the limitations of amended claim 1 and amended claim 11 respectively. Since amended claim 1 and amended claim 11 are believed to be allowable, claims 2-10 and 12 and 13 are

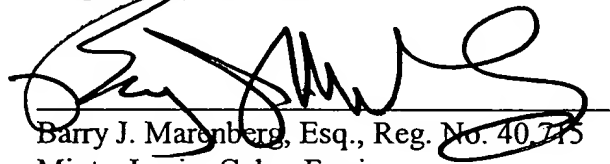
believed to be allowable for at least the same reasons. Reconsideration and withdrawal of the rejection on these grounds is respectfully solicited.

VI. CONCLUSION

Applicant has made a significant contribution to the art, neither disclosed nor suggested in any cited reference. It is submitted that all claims are in condition for immediate allowance, which action is respectfully solicited.

If, upon receipt and review of this amendment, the Examiner believes that the present application is not in condition for allowance and that changes can be suggested which would place the claims in allowable form, the Examiner is respectfully requested to call Applicant's undersigned counsel at the number provided below.

Respectfully submitted,



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VERSION WITH MARKINGS TO SHOW CHANGES MADE

In the claims:

Claims 1 and 11 have been amended as follows:

1. (Amended) A semiconductor wafer boat comprising:

- a) a first end and a second end;
- b) a plurality of slots positioned between the first and second ends for receiving semiconductor wafers therein, the semiconductor wafers being substantially circular and having an upper area and a lower area, each of the slots comprises ¹⁸first and second upper support guides ¹⁹to maintain the semiconductor wafers in a vertical orientation during wafer processing at elevated temperatures between approximately 1000 °C to 1400 °C; and
- c) [a] ²⁰an arcuate lower grooved portion for receiving the semiconductor wafers, wherein at least a part of the lower area of each of the semiconductor wafers in said ²¹plurality of slots [upon which a portion of the wafer is in] contacts the lower arcuate grooved portion such that the lower arcuate grooved portion substantially conforms to the at least part of the lower area of the semiconductor wafers that contact the arcuate lower grooved portion [,] and which supports the weight of the semiconductor wafer [when the wafer is] positioned thereon[, the grooved portion having an arcuate configuration which, at semiconductor processing temperatures of between approximately 1000 °C to 1400 °C, substantially conforms to the portion of the wafer supported thereon].

11. (Amended) A semiconductor wafer boat comprising:

- a) a first end and a second end;
- b) a plurality of slots positioned between the first and second ends for receiving semiconductor wafers therein, the semiconductor wafers being substantially circular and having an upper area and a lower area, each of the slots comprises first and second upper support guides to maintain the semiconductor wafers in a vertical orientation during wafer processing at elevated temperatures between approximately 1000 °C to 1400 °C;
- c) [a] an arcuate lower grooved portion for receiving the semiconductor wafers, wherein at least a part of the lower area of each of the semiconductor wafers in said plurality of slots [upon which a portion of the wafer is in] contacts the lower arcuate grooved portion such that the lower arcuate grooved portion substantially conforms to the at least part of the lower area of the semiconductor wafers that contact the arcuate lower grooved portion [,] and which supports the weight of the semiconductor wafer [when the wafer is] positioned thereon[, the grooved portion having an arcuate configuration which, at semiconductor processing temperatures of between approximately 1000 °C to 1400 °C, substantially conforms to the portion of the wafer supported thereon; and
- d) at least one window positioned not more than 10 mm from the first and second ends of the boat.